

REPORT DOCUMENTATION PAGE

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11. SUPPLEMENTARY NOTES The views, opinions and/or findings contained in this report are those of the author(s) and should not be construed as an official Department of the Army position, policy or decision, unless so designated by the documentation.					
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13. ABSTRACT (Maximum 200 words) This grant provided partial funding for the acquisition of a powerful femtosecond laser. The laser is to be used in making femtosecond time resolved measurements of shock waves in molecular materials, with the eventual application being understanding the sensitivity to shock initiation of energetic materials. After suitable negotiations, a CPA-10 laser from Clark-MXR Corporation was selected and ordered. To save money, some parts and diagnostic equipment were ordered and shipped to Clark for inclusion in the finished system. The laser was delivered in Oct. 1997. In the last several months, warranty repairs and improvements were made on the laser and the experimental set up is being constructed.					
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Final report: DURIP97 Femtosecond vibrational spectroscopy of shock waves in materials

The DURIP program provided \$156,401 for the purchase of a femtosecond laser and computer-controlled diagnostic equipment which would be used for shock wave studies. The University of Illinois provided matching funds of \$30,000. The laser selected was the CPA-10 from Clark-MXR Corp., Dexter MI. This laser produces pulses short enough (150 fs) for femtosecond spectroscopy, and intense enough (10 mJ) to make good shock waves.

Because this is a laser system which required Clark to combine parts from some other laser companies, the U of Illinois purchased these parts and shipped them to Clark. These other purchases followed a print out provided by Clark, and were obtained from Thorlabs (optical mounts), Electro-Optics (Faraday rotator), and Newport Corp. (optical mounts). In addition a computer (Dell Corp.) and computer-controlled laser beam profiler (Spiricon) were purchased and shipped to Clark for integration into the system. Finally a pump laser (Surelite II-10) from Continuum Corp. was purchased and drop-shipped to Clark. To purchase the pump laser with limited funds, a deal was arranged where an older laser from Dlott's lab was used as a trade in.

Eventually all this equipment was ordered. In particular, the purchase order for the CPA-10 had to be approved by the Board of Trustees, and it was cut on April 10, 1997. About Oct. 1, 1997 the laser arrived. After a couple of weeks, it was set up by technicians from Clark. Then pow! It blew up a bunch of optics right away! The optics were replaced, and some time was spent tracking down the problem. Eventually the laser settled down, although it did blow up some more things over the course of a couple of months. Now we think we understand the source of the problem, and the laser is working reasonably well, although Clark is working on some improvements suggested by our experiences.

It turns out the problems with the laser are typical growing pains for this type of high power equipment, and they did not hurt our effort very much, because we were always able to keep the laser running at low power while it was being worked on. That has allowed us to work on setting up the experiment, and to gain familiarity with the system. However keep in mind it typically takes 12-18 months to get these things all set up and to start getting data from the system.

This grant provided funds for equipment only. No personnel were supported by the grant. No publications or inventions have resulted so far. Two postdocs, Joseph J. Cavaleri and Alexi Lagoutchev worked on this laser project, supervised by Prof. Dlott.

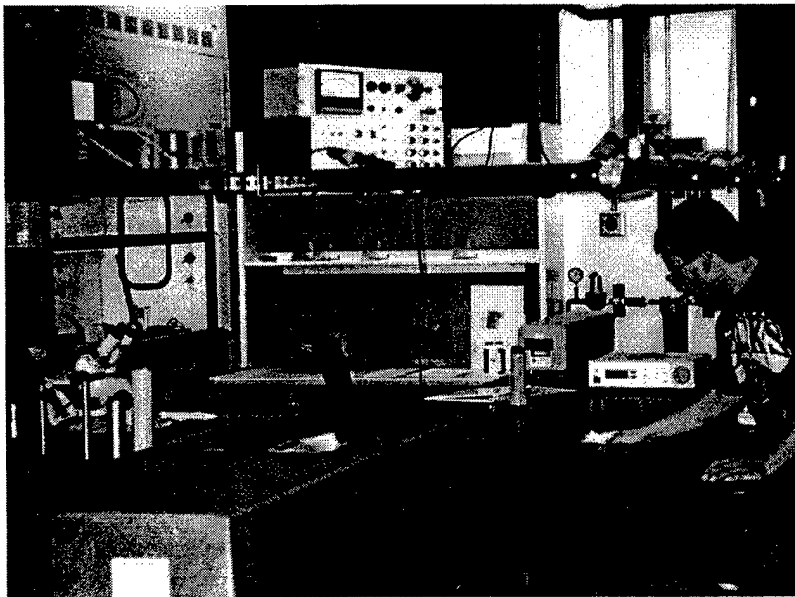


Figure 1. J. J. Cavaleri unpacking the new laser and installing it in Chemical and Life Sciences laboratory.